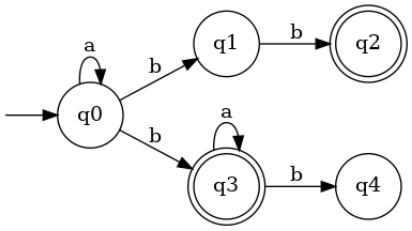
This homework covers sections 3.5 and 3.6. It is due in class Wednesday, April 3. Hand in a hardcopy of your solutions.

While you may discuss problems with other students, you should always make the first attempt on a problem yourself and **you must write up your own solutions in your own words**. *You may not collaboratively write solutions or copy a solution that one person in the group writes up.*

1. Consider the NFA that is defined by the transition diagram shown. Determine which of the following strings are accepted by this NFA. Just list the strings; you do not need to provide explanations or justifications.

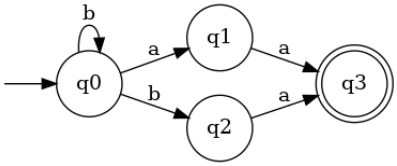


   a) *aaab* b) *bbb* c) *aabb* d) *baaaa*

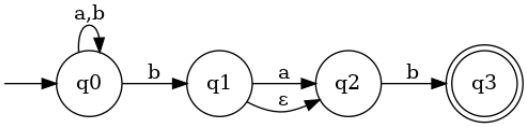
   e) *bbbbb* f) *aaabab* g) *bb* h) *baaabab*

2. For each of the following NFAs, use the NFA-to-DFA conversion algorithm to construct a DFA that accepts the same language as the NFA. (You must use the algorithm, and the states in the DFA should be sets of states from the NFA — no credit will be given for an equivalent DFA that was not generated by the algorithm.)

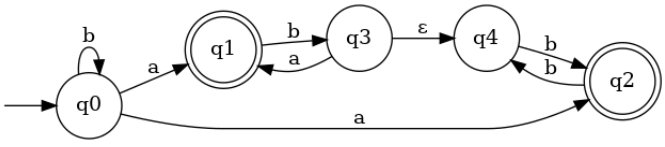
(a)



(b)



(c)

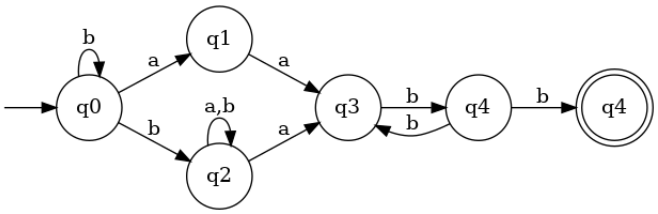


3. For each of the following regular expressions, use the construction described in the proof of Theorem 3.3 to build an NFA that accepts the language generated by the regular expression. (You must use this construction — no credit will be given for an equivalent NFA that was generated in a different way.)

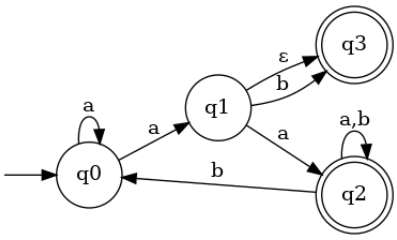
   a) a^*ba^* b) $(a|b)^*(aaa|bbb)$ c) $(aa|bb)c*(a|b|c)$

4. For each of the following NFAs, give a regular expression that generates the language accepted by the NFA. Use the strategy discussed in class in the context of Theorem 3.4 and show your work — little credit will be given for a correct regular expression without this evidence of the process.

(a)



(b)



5. Prove that the reverse of a regular language is regular by showing how to modify a machine that accepts L to get a machine that accepts L^R.